

Amendments to the Claims:

This listing of claims will replace all prior versions, and listings of claims in the application:

Listing of Claims:

1. (Currently Amended) A disc controller comprising:

a shared cache memory for temporarily storing data;

a plurality of disc drives each operable to transfer and store data from the shared cache memory; and

a plurality of circuit boards connected to the shared cache memory, each of the plurality of circuit boards comprising:

a network controlling unit operable to receive a data input/output request sent from an external device through a network and perform a conversion between a file access from the external device and a block access; and

a disc controlling unit formed in a same circuit board in which the network controlling unit is formed, the disc controlling unit coupled to the network controlling unit by an internal bus provided in the circuit board and operable to store data into the shared cache memory based on the file access transmitted from the network controlling unit; and

a fault monitoring unit operable to retrieve status information for the network controlling unit and determine whether a fault exists for the network controlling unit, the fault monitoring unit being further operable to determine whether the fault is attributable to hardware and, if so, send a message to another circuit board of the plurality of circuit boards to begin fail-over processing,

wherein the disc controlling unit receives a command sent from the network controlling unit through the internal bus and ~~execute~~ executes a data input/output for a disc drive in response to the command;

wherein the network controlling unit sends the command, for which a plurality of addresses are set, to the disc controlling unit;

wherein the disc controlling unit receives the command and execute data input/output corresponding to each of the addresses set in the command for the disc drive; and

wherein when a file to be processed based on the data input/output request is to be divided and stored in a plurality of storage areas of a disc drive, the network controlling unit generates the command in which a combination of a number of blocks and a plurality of logical addresses for designating respective divided storage areas are set, and

wherein when the file to be processed based on the data input/output request is to be stored in a continuous storage area of a disc drive, the network controlling unit generates the command in which a combination of a number of blocks and one logical address for a designating respective storage area are set.

2. (Original) A disc controller according to claim 1, wherein
a file system operates in the network controlling unit,
the data input/output request designates data, which is input/output to/from the disc drive, based on a file name, and
the network controlling unit generates an address corresponding to a storage location of data on the disc drive, which corresponds to the file name set for the data input/output request, and sets the address in the command.

3. (Original) A disc controller according to claim 1,
wherein the address is a logical address for designating a storage location of data in a logical area organized in a disc space of the disc drive.

4. (Original) A disc controller according to claim 1,
wherein the internal bus is a PCI bus.

5. (Original) A disc controller according to claim 1,
wherein the network controlling unit includes a communicating section communicating with the external device in accordance with a network protocol.

6. (Currently Amended) A disc controller according to claim 1, wherein

~~a memory accessible in a sharing manner by both the network controlling unit and the disc controlling unit is formed in the circuit board;~~

the network controlling unit and the disc controlling unit update, at a predetermined timing, operation state information indicating each of a plurality of operation states of the network controlling unit and the disc controlling unit; and, ~~which is stored in the memory; and~~

an occurrence of faults in the network controlling unit and disc controlling unit is detected based on the operation state information.

7. (Original) A disc controller according to claim 6, wherein the network controlling unit acquires, from the operation state information, an operation state of the disc controlling unit which is a sending destination of the command when the network controlling unit sends the command to the disc controlling unit, and determines, depending on the acquired operation state, whether the command should be sent to the disc controlling unit.

8. (Original) A disc controller according to claim 6, wherein the network controlling unit investigates the operation state of the disc controlling unit which is a sending destination of the command based on the operation state information when the network controlling unit can not acquire a receipt notification concerning the command sent to the disc controlling unit, and determines, depending on a investigation result thereof, whether the command should be sent to the disc controlling unit again.

9. (Original) A disc controlling unit according to claim 6, wherein the network controlling unit investigates the operation state of the disc controlling unit which is a sending destination of the command based on the operation state information when the network controlling unit can not acquire a receipt notification concerning the command sent to the disc controlling unit, and when the network controlling unit judges that the disc controlling unit is not normally operating, the network controlling unit sends the command to at least one of other disc controlling units.

10. (Original) A disc controller according to claim 6, further comprising:
a user interface for notifying the occurrence of the faults when the occurrence of the faults is detected.

11. (Original) A disc controller according to claim 6, wherein when the occurrence of the faults is detected, a signal for requesting a restart is sent to one of the network controlling unit and the disc controlling unit where the faults have occurred.

12. (Previously Presented) A disc controller according to claim 1, wherein:
the disc controlling unit includes an interface for connecting a backup device thereto;

the network controlling unit includes a section for receiving a backup request concerning the data stored in the disc drive from the external device, and for sending a backup command to the disc controlling unit; and

the disc controlling unit includes a section for sending a backup instruction concerning the data stored in the disc drive to the backup device upon receipt of the backup command.

13. (Currently Amended) A disc controller comprising:
a shared cache memory connected to a plurality of circuit boards for temporarily storing data for a plurality of disc drives;

a network controlling unit for one of the plurality of circuit boards to receive a data input/output request sent from an external device through a network and perform a conversion between a file access from the external device and a block access; and

a disc controlling unit formed in a same circuit board in which the network controlling unit is formed, the disc controlling unit being coupled to the network controlling unit by an internal bus provided in the circuit board, the disc controlling unit receiving a command sent from the network controlling unit through the internal bus, and input/output data to/from a disc drive in response to the command, the disc controlling unit being further operable to store

data into the shared cache memory based on the file access transmitted from the network controlling unit; and

a fault monitoring unit operable to retrieve status information for the network controlling unit and determine whether a fault exists for the network controlling unit, the fault monitoring unit being further operable to determine whether the fault is attributable to hardware and, if so, send a message to another circuit board of the plurality of circuit boards to begin fail-over processing,

~~wherein a plurality of circuit boards, connected so as to communicate with each other, are provided;~~

wherein an occurrence of ~~[[a]]~~ the fault of one of the circuit boards is detected by one of the other circuit boards by exchanging a heartbeat message among the circuit boards; and

~~wherein when the occurrence of the fault of one circuit board is detected by one of the other circuit boards, a circuit board other than the circuit board causing the faults substitutes for a processing of the circuit board causing the faults; and~~

wherein when a file to be processed based on the data input/output request is to be divided and stored in a plurality of storage areas of a disc drive, the network controlling unit generates the command in which a combination of a number of blocks and a plurality of logical addresses for designating respective divided storage areas are set, and

wherein when the file to be processed based on the data input/output request is to be stored in a continuous storage area of a disc drive, the network controlling unit generates the command in which a combination of a number of blocks and one logical address for a designating respective storage area are set.

14. (Currently Amended) A controlling method of a disc controller having a plurality of circuit boards each including a network controlling unit operable to receive a data input/output request sent from an external device through a network and perform a conversion between a file access from the external device and a block access, and a disc controlling unit formed in a same circuit board in which the network controlling unit is formed, the disc controlling unit being connected to the network controlling unit by an internal bus provided in

the circuit board, receiving a command sent from the network controlling unit through the internal bus, and inputting/outputting data to/from a disc drive in response to the command, the disc controlling unit being further operable to store data into the shared cache memory based on the file access transmitted from the network controlling unit, and a fault monitoring unit operable to retrieve status information for the network controlling unit and determine whether a fault exists for each network controlling unit, the method comprising:

by means of the network controlling unit, sending one command, for which a plurality of addresses are set, to the disc controlling unit; and

by means of the disc controlling unit, receiving the command and executing data input/output corresponding to each of the addresses set in this command for the disc drive; and

by means of the fault monitoring unit, determining whether the fault is attributable to hardware and, if so, sending a message to another circuit board of the plurality of circuit boards to begin fail-over processing,

wherein when a file to be processed based on the data input/output request is to be divided and stored in a plurality of storage areas of a disc drive, the network controlling unit generates the command in which a combination of a number of blocks and a plurality of logical addresses for designating respective divided storage areas are set, and

wherein when the file to be processed based on the data input/output request is to be stored in a continuous storage area of a disc drive, the network controlling unit generates the command in which a combination of a number of blocks and one logical address for a designating respective storage area are set.

15. (Currently Amended) A method according to claim 14, ~~wherein the disc controlling unit includes a memory accessible in a sharing manner by both the network controlling unit and the disc controlling unit; the method~~ further comprising:

updating by the network controlling unit and the disc controlling unit, at a predetermined timing, operation state information indicating each of a plurality of operation states of the network controlling unit and the disc controlling unit, which is stored in the memory; and

detecting an occurrence of faults in the network controlling unit and disc controlling unit based on the operation state information.

16. (Previously Presented) A method according to claim 14, wherein the disc controlling unit includes an interface for connecting the external device thereto; the method further comprising:

receiving by the network controlling unit a backup request concerning data stored in the disc drive from the external device, and sending a backup command to the disc controlling unit; and

sending by the disc controlling unit the backup command concerning the data of the disc drive to the backup device upon receipt of the backup command.

17. (Canceled)

18. (Previously Presented) A disc controller according to claim 13, further comprising:

a user interface for notifying the occurrence of the faults when the occurrence of the faults is detected.

19. (Previously Presented) A disc controller according to claim 13, wherein when the occurrence of the faults is detected, a signal for requesting a restart is sent to one of the network controlling unit and the disc controlling unit where the faults have occurred.

20. (Previously Presented) A disc controller according to claim 13, wherein the disc controlling unit includes an interface for connecting a backup device thereto;

the network controlling unit includes a section for receiving a backup request concerning the data stored in the disc drive from the external device, and for sending a backup command to the disc controlling unit; and

the disc controlling unit includes a section for sending a backup instruction concerning the data stored in the disc drive to the backup device upon receipt of the backup command.